

GREATER TORONTO AREA URBAN STRUCTURE CONCEPTS STUDY

BACKGROUND REPORT NO. 1 DESCRIPTION OF URBAN STRUCTURE CONCEPTS

Prepared for
The Greater Toronto Coordinating Committee

IBI GROUP
in association with
STEPHEN G. MCLAUGHLIN CONSULTANTS INC.

JUNE, 1990

IBI
GROUP

June 8, 1990

Mr. E. M. Fleming
Chairman
Greater Toronto Coordinating Committee
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Dear Mr. Fleming:

Background Paper No. 1: Description of Urban Structure Concepts

This is the first in a series of background reports for the Greater Toronto Area Urban Structure Concepts Study. The background reports in the series are as follows:

1. Description of Urban Structure Concepts;
2. Minimal Growth Option;
3. Transportation Systems;
4. Water, Sewers and Solid Waste;
5. Greening/Environment;
6. Human Services;
7. Comparison of Urban Structure Concepts;
8. Public Attitudes Survey (to follow in Fall, 1990).

The overall study results are presented in a separate report titled Summary Report: Greater Toronto Area Urban Structure Concepts Study.

This report describes the rationale and nature of the three urban structure concepts which are compared in the study. Following a brief introductory chapter, Chapter 2 presents an overview of the three urban structure concepts, including a discussion of the premises on which they were conceived and the issues addressed in developing them. Chapters 3, 4 and 5 present, respectively, a more detailed description of concepts 1, 2 and 3; this includes the principles on which each concept is based, the postulated distribution of population and employment by area municipality, a summary of urban densities and land consumption, and a broad portrayal of each concept in map form. An Overview Description of the three concepts and background assumptions is presented in Section 2.4.

We have attempted to capture, in the three concepts, the range of urban form attributes to be addressed in the study, in the context of comments received from the Urban Structure Subcommittee at the meetings held on February 27, March 9 and March 23, 1990. It should be emphasized that this is not a planning study and the three concepts are essentially case studies, each capturing a different set of urban structure attributes, as a basis for analysis and comparison.

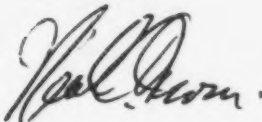
This study breaks new ground by drawing together demand, supply, cost and effectiveness findings for three quite different future urban forms for the entire GTA including both "hard" and "soft" infrastructure. There is, therefore, little precedent against which to assess the results, some of which are perhaps unexpected or at least thought-provoking. The results are therefore preliminary, for discussion. If, as the findings are scrutinized and the comparison ratings are discussed, a consensus emerges regarding a preferred future urban structure for the GTA and/or a process for moving purposefully in that direction, the study will have served its purpose.

The opinions offered herein are those of the consultant and reflect to the extent possible comments received from the Urban Structure Subcommittee established for this study. They do not necessarily reflect the views of the Greater Toronto Coordinating Committee or the governments represented on the Committee.

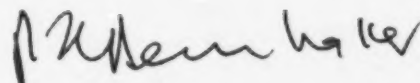
We trust that the information and opinions offered will be helpful in the context of the study and subsequent planning activities and decisions.

Yours sincerely,

IBI GROUP



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Greater Toronto Area Urban Structure Concepts Study: Background Report No. 1: Description of Urban Structure Concepts: Executive Summary

BACKGROUND AND OBJECTIVES

The Greater Toronto Coordinating Committee (GTCC) initiated this study in order to provide strategic information regarding the infrastructure requirements and costs to the year 2021 of three quite different urban structure concepts for the Greater Toronto Area. This information and related qualitative comparisons of the three concepts are intended to be a basis for informed debate regarding the most appropriate future distributions and densities of urban development in the Greater Toronto Area (GTA), as a basis for subsequent planning and development decisions.

The purpose of the Greater Toronto Area Urban Structure Concepts study is to develop three generic urban structure concepts for the GTA and to provide a broad, strategic comparison of the concepts with particular emphasis on their infrastructure requirements (e.g. transportation, hard services, greening/environment, human services) and the capital costs of such facilities, as well as impacts on the immediate hinterland of the GTA. Other important criteria such as environmental, economic and energy implications and the ability to achieve sustainable development were to be included in the comparison.

It is emphasized that this is not a planning study, in that none of the three concepts is being put forward as a recommended plan. Rather, each of the concepts is a case study, postulated in order to examine the infrastructure and related functional and quality aspects of three contrasting urban structure possibilities for the GTA.

THE THREE CONCEPTS

In accordance with the terms of reference, the three urban structure concepts were developed following the prescribed guidelines:

1. a status quo concept, representing a continuation of existing trends, characterized by substantial population growth in the suburban regions at relatively low density, with continuing concentration of office development downtown and in various subcentres in Metro and the four adjacent regions (designated as Concept 1, Spread);
2. a concept in which substantial additional population growth/intensification occurs within Metro Toronto, and other "mature"

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urbanized areas adjacent to Metro along with further intensification of employment activities, such that the rate of urbanization occurring beyond Metro boundaries would be significantly reduced (referred to as **Concept 2, Central**); and

3. an intermediate concept in which residential and employment growth occurs primarily in and around various existing communities in a compact form, resulting in reduced consumption of undeveloped land relative to Concept 1 (referred to as **Concept 3, Nodal**).

The three concepts are generic in that Concepts 1 and 2 are intended to test relative extremes of low and high population density and population/employment mix respectively, while Concept 3 represents an urban form aimed at compact, nodal growth with a relatively balanced population/employment mix and distribution of growth in all five regions of the GTA.

**OVERVIEW
DESCRIPTION**

Exhibit 2 in the body of the report shows the actual distribution of population and employment by region in the base year (1986) and the postulated distribution for each of the future years (2011 and 2021) for Concepts 1, 2 and 3. Also shown in each instance are the ratio of total employment to residential population in each region, referred to in this presentation as the activity rate, and estimates of the urbanized area and gross urban density for each concept.

All three concepts assume the same total population and employment in the GTA: 6.02 million people and 3.44 million jobs by 2021.

Concept 1, Spread, assumes a continuation of existing trends and has the same distribution of people and jobs throughout the five regions and 30 area municipalities as those developed in the Greater Toronto Area Coordinating Committee projections during the fall of 1989. Essentially, it would produce major population growth, at low densities, in the four suburban regions with continuing strong employment growth and modest population intensification (to 2.43 million persons by 2021) in Metro Toronto. Under this concept, the population in Metro Toronto would increase by 235,000 while the population of the four suburban regions would increase by 2.05 million persons.

Concept 2, Central, would provide a major redistribution of population, with growth of the Metropolitan Toronto population by 1.61 million to 3.80 million persons. In contrast, the population in the four suburban regions would increase by some 680,000 to

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2.22 million persons. Employment growth would be substantial in all five regions, such that there would be a considerably closer balance between the number of people and the number of jobs in each region than would be the case under Concept 1.

Concept 3, Nodal, would be intermediate in its broad distribution of population and employment, with 2.80 million persons in Metro Toronto by 2021, an increase of about 610,000, and 3.22 million persons in the four suburban regions, an increase of 1.68 million. While the "macro" distribution of people and jobs in Concept 3 would be similar to that of Concept 1, it would differ in having a significantly higher density of population and employment in the suburban regions because of its postulated compact, nodal growth based on existing communities.

The gross density for the entire GTA, measured in terms of population plus employment divided by urbanized area, would increase from about 15.4 per acre (38.0 per ha) in 1986 to 15.8 per acre (39.0 per ha) in 2021 under Concept 1, Spread, 20.4 per acre (50.4 per ha) under Concept 2, Central, and 18.1 per acre (44.7 per ha) under Concept 3, Nodal. Conversely, the urbanized area, which would grow from about 590 sq. miles (1,520 sq.km) in 1986 to about 940 sq. miles (2,420 sq.km) in 2021 under Concept 1, would be considerably less at 730 sq. miles (1,870 sq.km) in 2021 under Concept 2 and an intermediate level of 820 sq. miles (2,110 sq.km) under Concept 3.

The implied growth trends of the three concepts are illustrated graphically in Exhibits 3A and 3B in the body of the report. Details regarding population and employment levels, land areas and densities by area municipality are shown for 1986 and the two future years (2011 and 2021) considered in this study, in Exhibit 5 for Concept 1, Exhibit 9 for Concept 2 and Exhibit 11 for Concept 3. Maps showing in conceptual terms the general form and extent of urbanization under each concept are shown respectively in Exhibits 6, 10 and 12. The principles based upon which each concept was developed are also described.

**A BASIS FOR
COMPARISONS**

The three urban structure concepts described in this report were the basis for comparing infrastructure requirements, capital costs and other qualitative aspects of the three concepts, as described in the other background reports and the Summary Report of this study.

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1. INTRODUCTION

1.1 BACKGROUND

As documented in the Terms of Reference and elsewhere, the Greater Toronto Area (GTA), comprising Metropolitan Toronto and the Regional Municipalities of Durham, Halton, Peel and York, is at a critical point in its development:

- most of the land in Metro Toronto has been developed; population growth has therefore slowed but rapid employment growth continues and there are significant options for further population growth through intensification and development/redevelopment of a number of major sites;
- rapid urbanization is occurring in the four adjacent Regional Municipalities; major issues include the structure and density of development and the balance/mix of population and employment, which greatly affect infrastructure requirements;
- in the GTA as a whole, rapid growth in the number of people and jobs, compounded by unprecedented increases in per capita demand for transportation, hard (water and sewer) services, waste disposal, housing, health, education, social services and recreation, have placed great strains on the infrastructure required to provide these services;
- continuing rapid growth is forecast for the GTA and, while rates of per capita demand increases may taper off to some extent (e.g. with saturation of the rate of entry by women into the labour force and a correspondingly reduced rate of employment growth relative to population, increasingly due to the aging of the population), massive infrastructure investments will be required to address supply-demand deficits which accumulated during the 1970s and 1980s, along with the requirements of an additional one and one-half to two million people expected to be living in the GTA 20-30 years from now;

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- important decisions on the density, structure and mix of land uses and the types and locations of infrastructure will be required in order to maintain and enhance, if possible, the quality of living (in terms of measures such as housing and urban amenities, economic opportunities, transportation, water supply and sewage/waste disposal, preservation/enjoyment of green areas, quality of the urban and rural environment, and availability of human services) now enjoyed by inhabitants of the GTA;
- coordinated long range planning and a means for the overall management of growth and implementation of infrastructure is required which, while relatively easy in earlier decades when most of the growth was occurring in Metro Toronto, is now more complex because of the involvement of five regional governments, 30 local municipalities, and a large number of boards and commissions. The provincial government, through its Greater Toronto Coordinating Committee (GTCC) in cooperation with the relevant ministries, has been working with representatives of the regional and local municipalities to set up a workable process which will provide this coordinated approach.

**1.2 STUDY
OBJECTIVES AND
SCOPE**

The general objective of this study is to develop three generic urban structure concepts for the GTA and to provide a broad, strategic comparison of the three concepts with particular emphasis on their infrastructure requirements (e.g. transportation, hard services, human services, open space) and the capital costs of such facilities, as well as impacts on the immediate hinterland of the GTA. The comparison is also to include other important criteria such as environmental, economic and energy implications and the ability to achieve sustainable development, help preserve the regional and global environment, and maintain at as high a level as feasible the quality of life for those living and working in the GTA and areas surrounding it. Major influencing issues and policy aspects inherent in each urban structure concept are also to be identified and discussed.

**1.3 NOT A
PLANNING STUDY**

It is important to emphasize that this is not a planning study, in that none of the three concepts is being put forward as a recommended plan. Rather, each of the concepts is a case study, postulated in order to examine the infrastructure and related functional and quality aspects of three quite different urban structure possibilities for the GTA. The study results will help provide a basis for decisions on the nature of the next phase of the strategy.

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The study is, therefore, a pre-planning exercise, aimed at providing basic information regarding the three generic concepts, as a basis for consideration and discussion by those responsible for managing, developing and servicing the GTA and by the public at large. Insights resulting from the study may be expected to influence subsequent planning activities. For example, it is possible that hybrid urban structure/infrastructure concepts may be developed subsequently, drawing on the most promising aspects of the original three generic concepts, and that one or some combination of these may be adopted as a planning framework for ongoing development and infrastructure decisions. Such a framework is needed, not only for the next 20 or 30 years but also to appreciate the longer term implications (i.e. beyond 30 years) of several development scenarios.

This pre-planning study is the first step: a "what if" exercise to demonstrate the basic urban structure and infrastructure attributes of three very different scenarios for the GTA 20 or 30 years from now.

2. OVERVIEW OF URBAN STRUCTURE CONCEPTS

2.1 THREE GENERIC CONCEPTS

In accordance with the terms of reference, the three urban structure concepts were developed following the prescribed guidelines:

1. a status quo concept, representing a continuation of existing trends, characterized by substantial population growth in the suburban regions at relatively low density, with continuing concentration of office development downtown and in various subcentres in Metro and the four adjacent regions (designated as **Concept 1, Spread**);
2. a concept in which substantial additional population growth/intensification occurs within Metro Toronto, and other "mature" urbanized areas adjacent to Metro along with further intensification of employment activities, such that the rate of urbanization occurring beyond Metro boundaries would be significantly reduced (referred to as **Concept 2, Central**); and
3. an intermediate concept in which residential and employment growth occurs primarily in and around various existing communities in a compact form, resulting in reduced consumption of undeveloped land relative to Concept 1 (referred to as **Concept 3 Nodal**).

The three concepts are generic in that Concepts 1 and 2 are intended to test relative extremes of low and high population density and population/employment mix respectively, while Concept 3 will test an urban form aimed at compact, nodal growth with a more balanced population/employment mix and distribution of growth in all five regions of the GTA.

2.2 TYPOLOGY

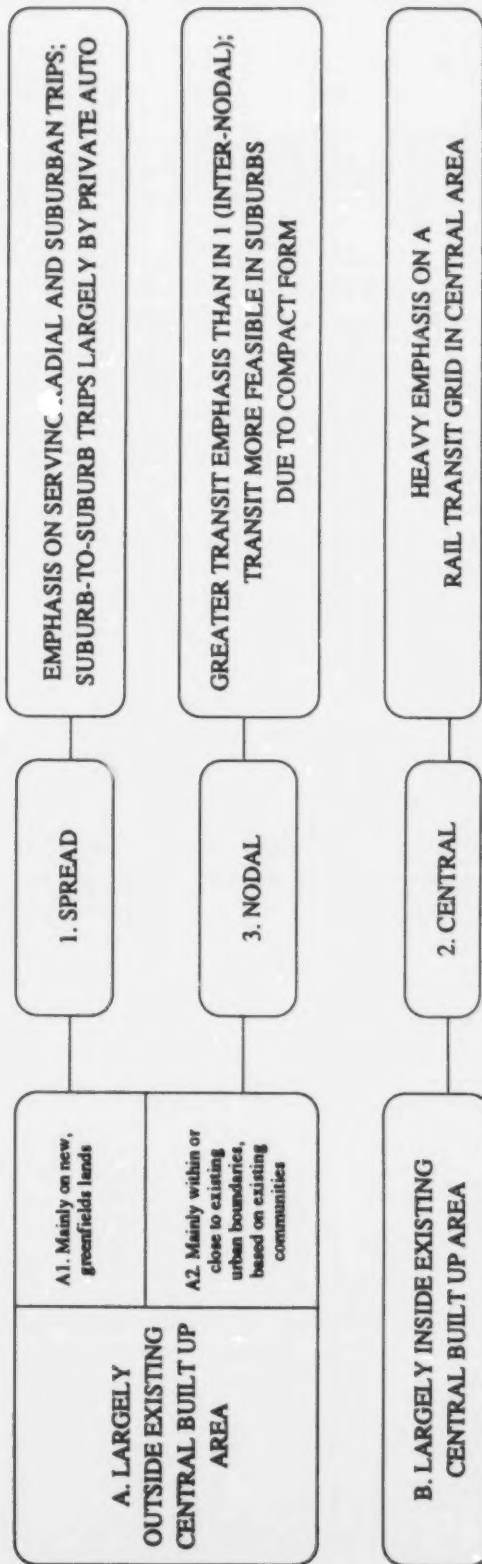
In order to help understand the basic differences and logical origins of the three urban structure concepts, Exhibit 1 presents a typology, or basic classification system, for the three concepts.

In a "macro" sense, there are two basically different options for distributing the approximately 2 million additional people expected to be living in the GTA in 2021 relative to the current population of about 4 million. In the exhibit, we label these A. and B., as follows:

- A. future new population is largely distributed **outside** the existing central built up area;

EXHIBIT 1: GTA URBAN STRUCTURE CONCEPTS: TYPOLOGY

FUTURE POPULATION DISTRIBUTION OPTIONS	URBAN STRUCTURE CONCEPTS	BASIC TRANSPORTATION CONCEPTS
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- B. future new population is located largely **inside** the existing central built up area.

These two distributions of population growth are fundamentally different, such that they are expected to exhibit major infrastructure differences and impacts in all major areas considered under this study (transportation, hard services, greening/environment, human services, external impacts).

Within option A there are two basic ways in which the population and related employment could be distributed, as follows:

Spread distribution: relatively low density, evenly distributed population and employment distribution occurring mainly on new, "greenfields" land (although with some significant employment concentrations as in the existing situation);

Nodal: a more clustered distribution of population and employment into higher density nodes located mainly within or adjacent to existing urban boundaries but associated with existing **suburban** communities (e.g. Milton, Richmond Hill) as well as those in the central, built-up areas, producing a more compact urbanized form.

As shown in Exhibit 1, these two ways of distributing population and employment, under Option A in which most such new development takes place **outside** the central existing built up area, correspond to Concept 1, Spread, and Concept 3, Nodal, respectively. As described further below, Concept 1 is postulated as having a somewhat higher population in the four regions adjacent to Metro Toronto than is the case for Concept 3; this difference is larger for York, Durham and Halton than it is for Peel, reflecting the fact that Peel contains the major cities of Mississauga and Brampton which are reaching "maturity" as contiguous parts of the GTA's main urbanized area, and which may therefore be considered as transitional between the mature urban state of Metro Toronto (essentially no greenfields lands left for development) and the other three suburban regions (which are characterized by smaller urban communities, still having relatively easy access to adjacent greenfields land). The main difference between the two concepts, however, is the spread out, lower density nature of Concept 1 (most of which occurs on new, greenfields land) versus the more compact, nodal distribution in Concept 3 (much of which would be redevelopment, plus higher density development on adjacent new land).

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The other fundamental population distribution, characterized as option B. above with most of the new population locating **inside** the existing central built up area, leads directly to urban structure Concept 2, Central. It would, in theory, be possible also to postulate two ways of distributing population under the centralized option: one in which redevelopment would occur fairly uniformly throughout the urbanized area, and the other in which redevelopment would be more concentrated into specific sites. The first of these was not developed into a concept for further study, mainly because it would be less practical to redevelop and intensify the population on every city block than it would be to leave the majority of such blocks essentially as they are now (possibly with some infill, intensification along major arteries, and higher utilization of existing housing stock), with the major population growth occurring by creating residential density on currently under-utilized industrial or institutional land. The other reason for selecting this sub-option for Concept 2 is that such a distribution of population and employment is more efficiently served by public transit than would be the case for a more uniform distribution of people and jobs; since it is a basic premise that the Central concept would require a greatly increased emphasis on transit, it is therefore logical to select the more site specific form of Concept 2 for analysis under this study. Population and employment intensification will tend to occur on land which is well served by existing or committed transit/commuter rail lines and which is currently not used to its potential.

This typology also helps to explain why it is harder to illustrate Concept 3, nodal, on a map than is the case for Concepts 1 and 2:

Concept 1, Spread, is relatively easy to draw on a map, since most of the new population can be assumed to be relatively uniformly distributed on greenfields land adjacent to the existing urbanized area. Existing employment centres, such as the Metro Toronto CBD and the North York, Scarborough and Mississauga city centres, are assumed to continue growing in employment terms but without a major intensification of population in such centres;

Concept 2, Central, can be illustrated on a map by showing a much tighter urban envelope (essentially in the same location as the existing urban envelope), with areas of population as well as employment concentration on major redevelopable sites in Metro Toronto and other mature/maturing urban areas such as Mississauga;

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Concept 3, Nodal, is not so easily depicted in map form because, while the nodes within the existing central urbanized area (largely Metro) can be located at the existing city centres and some other major redevelopable sites, those outside the existing built up area could be at a variety of different locations, and there are fewer guidelines (e.g. in terms of the areas of redevelopable land available) regarding their number and size. Clearly, there must be a strong relationship between a postulated mapping of the nodal concept and the basic transportation system (particularly in terms of commuter rail and rail rapid transit lines) which is assumed to serve and help shape the nodal concept.

This relationship is addressed very broadly on the right hand side of Exhibit 1:

Concept 1, Spread, is anticipated to have a transportation concept which emphasizes improved service for radial trips (between large, spread out resident population in the suburban regions and increased employment in the mature urban areas [much of it concentrated in the Metro CBD and other city centres]) and trips to more evenly distributed employment growth in the suburban areas. In order to serve the greatly increased radial demands while recognizing the space and other limitations on constructing new radial roads in urbanized areas, the transportation concept is expected to include improved commuter rail services, possible extensions of existing rapid transit lines into the adjacent regions, possible "crosstown" or "circumferential" rapid transit connectors between the radial "spokes" or commuter rail and rapid transit lines, and substantial improvements/extensions of both arterial roads and major highways in the suburban areas. Most such roads would likely carry bus routes, many with relatively low ridership because of the low density of population and employment;

Concept 2, Central, is anticipated to place the major transportation emphasis on a much improved grid of rapid transit and commuter rail lines within the existing urbanized area, with a strong emphasis on crosstown and circumferential lines as well as improved radial lines but with less emphasis on extending the latter beyond the existing central urban envelope, and a correspondingly reduced emphasis on road network improvements and expansions;

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Concept 3, Nodal, is anticipated to have a transportation concept which may look quite similar to that for Concept 1 when drawn conceptually on a map, but would have a considerably greater transit emphasis in terms of the capacity and service level provided, and possibly a greater emphasis on crosstown/ circumferential rapid transit or commuter rail lines providing more direct connections among the nodes. A single nodal urban structure concept is studied, however, as described further below in Chapter 5.

2.3 MAJOR ISSUES

A number of important issues and principles were considered in developing the three urban structure concepts, as follows:

- the "base case" population and employment forecasts to 2021, prepared during the fall of 1989 by the Greater Toronto Coordinating Committee (GTCC) and its consultants (Clayton Research Associates Limited and Hemson Consulting Ltd.), in collaboration with the regional municipalities, were taken as the basis for Concept 1. This reflects the premise that the GTCC projections are an extension of existing trends. They are not targets, and we understand that these projections will be updated annually. This assumption and definition of Concept 1 was confirmed by the Urban Structure Subcommittee at the meetings on February 27 and March 9, 1990;
- the GTA totals for population and employment, as projected under the GTCC "base case", were taken as the GTA totals also for Concepts 2 and 3, in order that valid comparisons could be drawn among the three concepts in terms of overall costs for infrastructure, etc. It is recognized that overall population and employment growth may be affected by conditions experienced under the three concepts, but such differences in general are very difficult to quantify and, if this were attempted, would complicate the comparisons;
- Concept 2, Central, reflected a fairly extreme level of population intensification in Metropolitan Toronto and adjacent urbanized areas, in order to test the impact of higher population density in existing central, urbanized parts of the GTA, and a more even balance between population and employment within Metro and in each of the surrounding regions. The intent is to test as high a level of population in Metro by 2021 as feasible, bearing in mind redevelopable land areas and reasonable redevelopment

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densities in Metro and also recognizing existing (late 1989) population levels and approved developments (although not necessarily Official Plan levels) in the rapidly growing suburban regions;

- similarly, the variety of locations and sizes of development nodes under Concept 3 reflects the locations of existing established communities, locations with high accessibility under the existing and potentially expanded transportation network for this concept, and considerations of available land, distance from the Metropolitan centre, and transportation capacity.

Accessibility, for all three concepts, includes intercity transportation and access to major facilities (e.g. Pearson International Airport, a possible new airport in north Pickering, Union Station) and major recreational areas, as well as transit and road connections for intra-GTA passenger and goods movements.

2.4 OVERVIEW DESCRIPTION

Regional Distributions of Population and Employment

Exhibit 2 shows the actual distribution of population and employment by region in the base year (1986) and the postulated distribution for each of the future years (2011 and 2021) for Concepts 1, 2 and 3. Also shown in each instance are the ratio of total employment to residential population in each region, referred to in this presentation as the activity rate, and estimates of the urbanized area and gross urban density for each concept.

The source of the base year numbers is the 1986 census and the reports prepared by Clayton Research Associates Limited and Hemson Consulting Ltd. for the GTCC in October, 1989 in support of the GTCC projections referred to earlier. Similarly, as noted above, the source for the Concept 1 figures is the Clayton and Hemson reports, taking the "base case" projections. It can be seen that Concept 1 represents a greater increase in jobs relative to people within Metro than is now the case, and a relatively minor increase in this ratio in three of the four adjacent regions, with a reduction in Durham. An important implication of this concept, therefore, is a strengthening of the trend toward long work trips from residential areas in the surrounding regions to jobs in Metro, with corresponding demands on the transportation infrastructure.

Concept 2, Central, was based in part on an estimate of how much residential population could be accommodated in Metro Toronto if

EXHIBIT 2

File Overview.wk1

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GTA Urban Structure Concepts: Overview of Population and Employment Distributions by Region

BASE YEAR (1990)	DURHAM		HALTON		METRO		PEEL		YORK		GTA TOTAL	
	2011	2021	2011	2021	2011	2021	2011	2021	2011	2021	2011	2021
Resident Population, P (000's)	326	704	271	563	2193	2428	592	1106	351	851	3733	6020
Total Employment, E (000's)	137	309	119	271	1349	1724	304	631	170	456	2079	3440
Activity Rate (E/P)	0.420	0.389	0.439	0.457	0.615	0.710	0.514	0.527	0.484	0.501	0.557	0.571
Urbanized Area (000's of acres)	49.2	90.3	45.4	84.7	152.9	152.9	74.1	129.3	54.8	116.5	376.4	590.7
Gross Density ((P+E)/Urbanized Area)	9.4	11.1	8.6	10.2	23.2	27.2	12.1	14.1	9.5	11.2	15.4	15.8
CONCEPT 1: Spread												
Resident Population, P (000's)	673	704	497	563	2356	2428	1090	1106	851	1007	5438	6020
Total Employment, E (000's)	280	309	244	271	1686	1724	593	631	456	505	3259	3440
Activity Rate (E/P)	0.416	0.389	0.491	0.457	0.715	0.710	0.559	0.527	0.536	0.501	0.599	0.571
Urbanized Area (000's of acres)	87.3	90.3	74.3	84.7	152.9	152.9	119.0	129.3	116.5	133.5	550.0	590.7
Gross Density ((P+E)/Urbanized Area)	10.9	11.1	10.0	10.2	26.4	27.2	13.9	14.1	11.2	11.3	15.8	15.8
CONCEPT 2: Central												
Resident Population, P (000's)	455	475	362	378	3310	3800	794	828	517	540	5438	6020
Total Employment, E (000's)	253	263	203	211	2046	2183	465	479	293	304	3259	3440
Activity Rate (E/P)	0.557	0.554	0.560	0.560	0.618	0.574	0.585	0.578	0.566	0.564	0.599	0.571
Urbanized Area (000's of acres)	68.4	70.8	59.6	61.7	152.9	152.9	95.5	98.3	77.4	80.1	453.8	463.8
Gross Density ((P+E)/Urbanized Area)	10.4	10.4	9.5	9.5	35.0	39.1	13.2	13.3	10.5	10.5	19.2	20.4
CONCEPT 3: Nodal												
Resident Population, P (000's)	595	681	464	545	2626	2800	1050	1190	703	804	5438	6020
Total Employment, E (000's)	288	312	240	296	1748	1794	600	651	383	417	3259	3440
Activity Rate (E/P)	0.484	0.456	0.517	0.488	0.666	0.641	0.571	0.547	0.545	0.519	0.599	0.571
Urbanized Area (000's of acres)	77.4	84.7	63.5	69.4	152.9	152.9	109.9	118.4	88.0	96.4	491.7	521.8
Gross Density ((P+E)/Urbanized Area)	11.4	11.7	11.1	11.7	28.6	30.0	15.0	15.5	12.3	12.7	17.7	18.1

Note: Concept 1 is the GTCC "Base Case" Projection.

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major parcels of land were redeveloped for residential and mixed residential/employment uses at appropriate redevelopment densities. As described more fully below in Chapter 4, it was estimated that, under this concept, up to 4 million people could conceivably be accommodated in Metro Toronto; a slightly lower level of 3.8 million people was selected, for the year 2021, based on reasoning described in Chapter 4. The distributions of population and employment in Metro and the other four regions were then estimated reflecting the existing distributions and growth rates and reasonable trends in the activity rate in each region. An examination of the resulting activity rates shows that this concept provides a test of a greater balance between population and jobs within each region, with Metro having levels comparable with those in 1986 and the surrounding regions having a significantly better balance between people and jobs than would be the case under Concept 1.

Concept 3, Nodal is intermediate between Concepts 1 and 2, with a 2021 population of 2.8 million in Metro Toronto and correspondingly higher populations in the four other regions than would be the case under Concept 2. Similarly, the activity rates under Concept 3 would be intermediate between those of Concepts 1 and 2.

As noted earlier in Section 2.2, while there is some similarity between the levels of population and employment in each region under Concepts 1 and 3 (particularly in Peel), there would be a significant difference in the density and distribution of urban development, with Concept 3 portraying a more compact, nodal type of development and Concept 1 portraying a more spread development at lower densities.

**Demographic,
Economic and
Immigration
Assumptions**

Implicit in all three concepts is the assumption that, generally, existing demographic trends, social values and immigration policies will persist during the 30 years under consideration. The basic demographic trends include:

- continuing rapid entry of women into the out-of-home labour force, but at reduced rates relative to the last two decades, reflecting increasing saturation of participation rates for women;
- continuing rapid rates of household formation until the turn of the century, as the remainder of the baby boom generation enters the real estate market;

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- an increasing number of retired persons living in the community, particularly following 2011 as the baby boom generation starts to reach retirement age;
- reflecting the above, an increase in the overall participation rate between 1986 and 2011, followed by a decline to an intermediate level by 2021;
- a persisting trend to smaller household sizes, but at declining rates relative to those experienced in the past 20 years;
- an overall age distribution for the GTA which is identical in all three concepts.

In terms of social values and economic conditions, the following assumptions are implicit in all three concepts:

- a continuing belief in social democracy;
- increasing policies and actions to preserve the environment and natural resources on a "sustainable development" basis;
- continuing reliance on a market-based economy with the expectation of continuing growth in the context, however, of economic uncertainties relating to increasing levels of international competition, significant changes in trading agreements and patterns, and the extremely high debt load of the Government of Canada and other public and private sector participants affecting the economy of the GTA;
- persistence of the GTA as the nation's prime financial, commercial and industrial centre;
- continuation of the federal policy of regional income redistribution, without which there could be increased in-migration to the GTA from less prosperous parts of Canada.

It is recognized that there are tensions between some of the above assumptions (e.g. possible impacts on economic growth rates if "sustainable development" limits are agreed to).

Assuming that the low fertility rate which has applied since the mid-1960's persists, the most important variable affecting future GTA population growth is the rate of net in-migration. The population

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projections on which this study is based assume that present Canadian immigration policy will persist, but with a future rate of net immigration to the GTA about 60% higher than was experienced during the period 1971-1986: 40,000 per year versus 25,000 per year. (See also Background Paper No. 2: Minimal Growth Option.) While a relatively high proportion of GTA in-migrants are likely to be from abroad, it is assumed that the new arrivals will tend to adapt to Canadian conditions and social customs, including housing preferences, in a manner similar to that which has been experienced during the past two or three decades. It is important to recognize that any significant changes in Canada's immigration policy, a federal jurisdiction, would strongly affect population growth rates in the GTA; a more restrictive policy would result in lower population/employment levels than those projected for the GTA in this study and, conversely, higher international immigration rates would contribute to a higher GTA growth rate.

**Implied Growth
Trends**

Exhibit 3(a) illustrates the implied population growth trends in each region for each of the three concepts to the years 2011 and 2021, in the context of past growth trends between 1971 and 1986 in each case. Similar trends and projections are also shown for the GTA as a whole. Exhibit 3(b) shows implied employment growth trends in the same format. In order to emphasize that this is not a planning exercise, and that each concept is a case study for testing future infrastructure and related implications, Exhibits 3(a) and 3(b) deliberately leave out any trend lines between 1986 and 2011.

It can be seen, however, that the 2011 to 2021 trends implied by the three concepts are not inconsistent with a projection of past trends in each region and for the GTA as a whole. The other point graphically illustrated in Exhibit 3 is that the levels/trends of population are more similar between Concepts 1 and 3 in most of the regions, with Concept 2 being quite different and, in fact, testing a fundamentally different population distribution, as discussed earlier.

**Urban Densities and
Land Consumption**

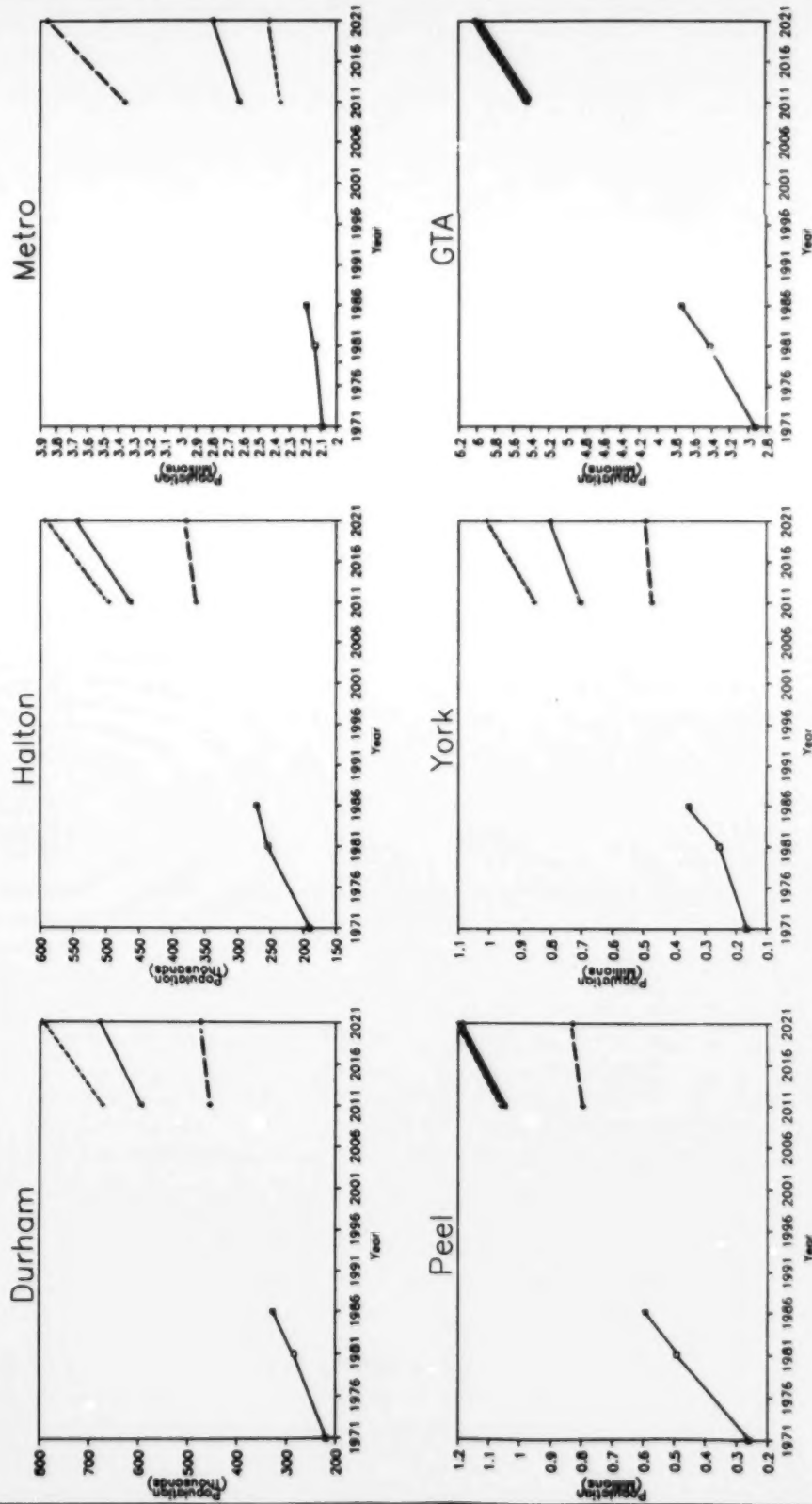
Exhibit 2 also provides an overview of the urbanized land area in each Region and the GTA as a whole in 1986 and the amount of greenfields land which would be consumed during the 35 year period under each concept.

It can be seen that there are significant differences among the three urban structure concepts in terms of the amount of greenfields land consumed by each. Starting with an existing urbanized area of about 376,000 acres (152,000 ha) in 1986, Concept 1, Spread, would grow to an urbanized area of about 600,000 acres (242,000 ha), an increase of about 224,000 acres (91,000 ha) or a 60% increase over the

EXHIBIT 3A

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Implied Population Trends by Region: 1971 - 2021

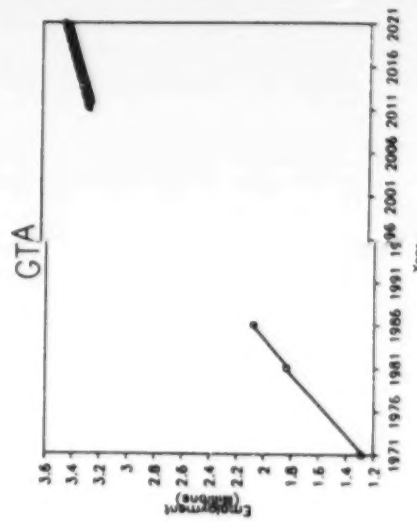
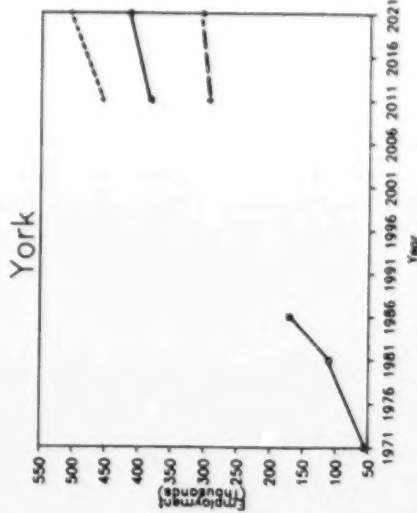
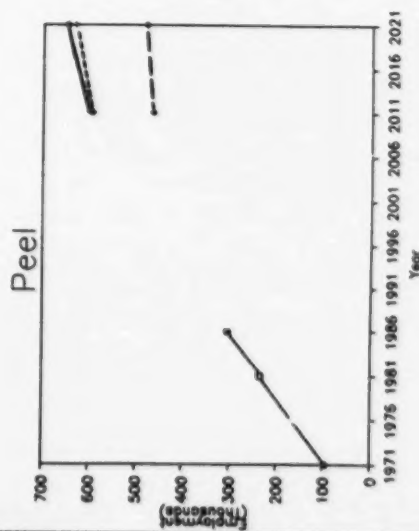
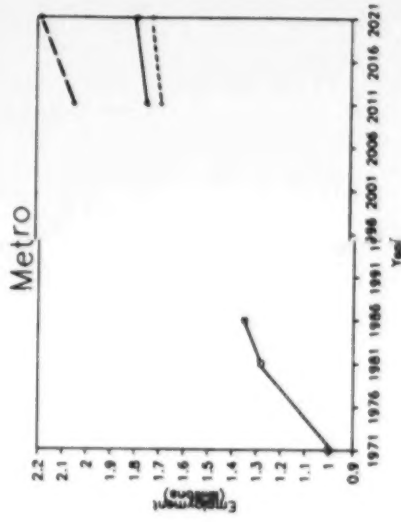
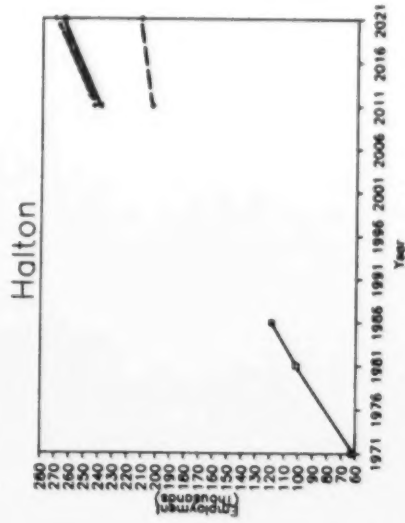
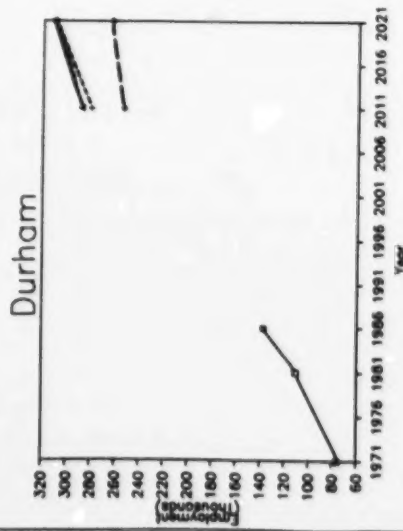


Legend: ---+--- Concept 1, Spread ---o--- Concept 2, Central ---o--- Concept 3, Nodal

EXHIBIT 3B

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Implied Employment Trends by Region: 1971 - 2021



----- Concept 1, Spread

---o--- Concept 2, Central

----- Concept 3, Modal

Legend

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amount of land urbanized in 1986. In contrast, Concept 2, Central, would have an urbanized area of about 464,000 acres (187,000 ha) by 2021, a growth of about 88,000 acres (36,000 ha) or a 23% increase over the 1986 urbanized area. Concept 3, Nodal, would be intermediate between the other two concepts, with a 2021 urbanized area of about 522,000 acres (211,000 ha), an increase of about 146,000 acres (59,000 ha), making it 39% larger than the 1986 urbanized area.

Correspondingly, the gross urban density (defined as population plus employment divided by urbanized area) would be lower in Concept 1 than in Concept 2 and would have an intermediate value in Concept 3. As shown in the right hand column of Exhibit 2 the gross density, which was about 15.4 people plus jobs per acre (38.0 per ha) in 1986, would be about 15.8 per acre (39.0 per ha) for Concept 1, would rise to 20.4 per acre (50.4 per ha) for Concept 2, and would have an intermediate level of 18.1 per acre (44.7 per ha) for Concept 3, by 2021.

Analysis Districts

For purposes of this study, we present population and employment distributions by area municipality for each of the three concepts. The boundaries of the 30 area municipalities in the GTA are shown in Exhibit 4. The area municipality distributions are used because the base year data are more readily available and it is felt that the distributions will be more easily understood when keyed to local political jurisdictions.

For purposes of analyses related to infrastructure requirements, etc., a somewhat finer set of analysis district was also used, involving the 16 planning districts within Metropolitan Toronto and subdividing some of the area municipalities outside of Metro Toronto. The resulting 62 analysis districts are shown in Appendix A, in map form in Exhibit A-1, and Exhibit A-2 lists the existing and projected population and employment at the 62 analysis district level.

A further disaggregation of population and employment was also made to the level of TARMS (Toronto Area Regional Modelling System) zones, as originally developed by the provincial Ministry of Transportation, for purposes of the transportation analyses of this study. Since there are 1,047 TARMS zones in the GTA, lists of estimated population and employment at this level are not provided here.

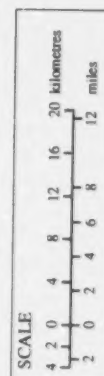
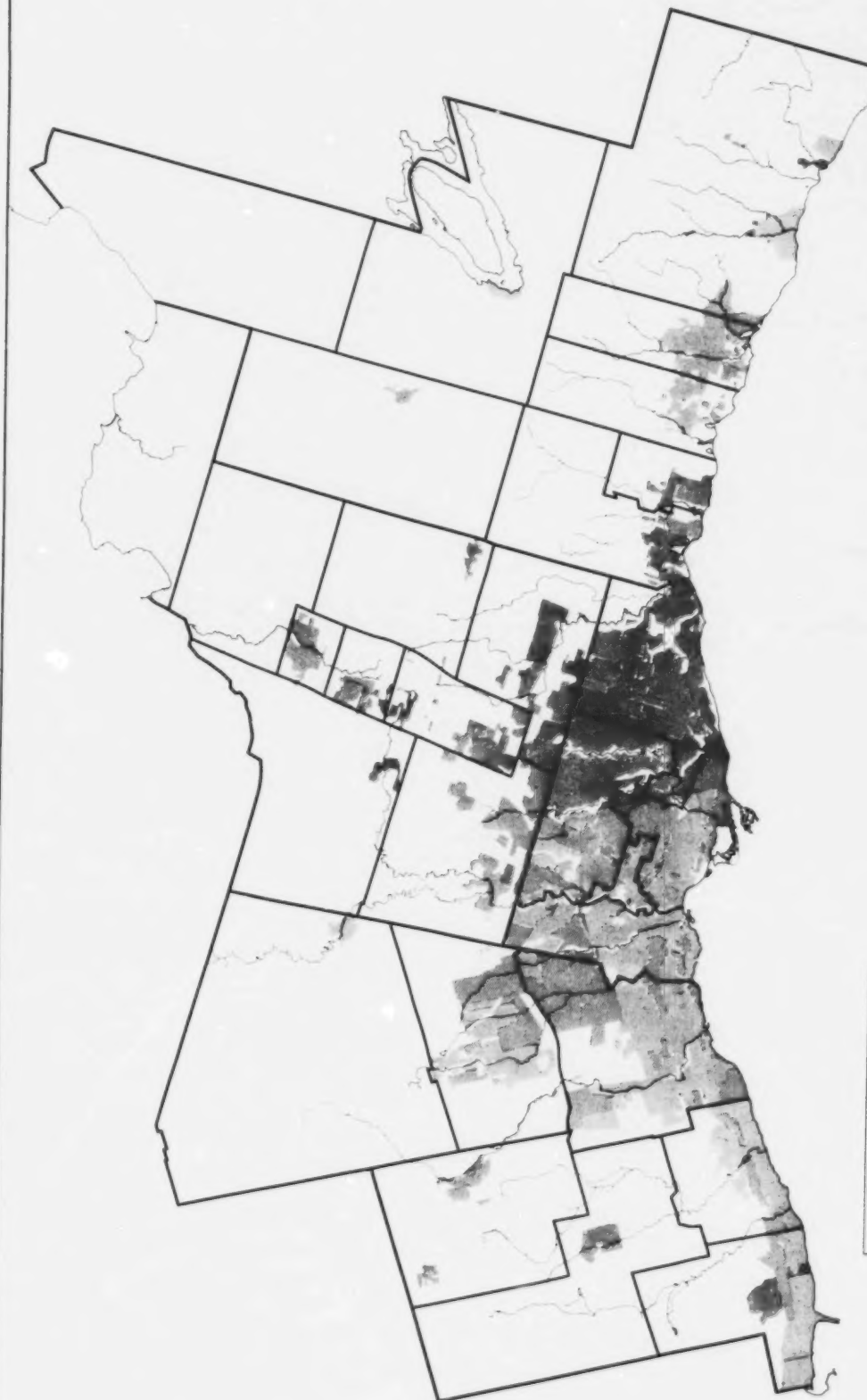
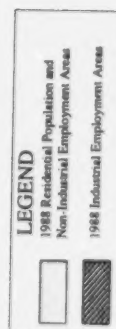


EXHIBIT 4
GTA:
MAP OF AREA MUNICIPALITY BOUNDARIES



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**3. CONCEPT 1:
SPREAD**

**3.1 CONCEPT
PRINCIPLES**

As noted earlier, the regional and area municipal distributions of population and employment under this concept reflect the "base case" projections prepared by the GTCC during the fall of 1989.

**3.2 DISTRIBUTION
OF POPULATION
AND EMPLOYMENT**

Exhibit 5 provides a more detailed appreciation of the projected distribution of population and employment by area municipality under Concept 1. The gross densities at which this development is assumed to occur and the acres of greenfields land which would be consumed by 2011 and 2021 under these assumptions are also shown.

The table shows the existing (1986) population and employment (subdivided into non-industrial and industrial), the estimated current urbanized land in 1986 (the latter subdivided into two categories: residential plus non-industrial employment, which tend to be fairly intimately mixed at the macro scale considered in this study, particularly when considering "population-serving" employment; and industrial employment), and the 1986 gross densities for these two categories of urbanization. Shown at the right hand side of the exhibit is similar information for the spread city concept, for the year 2011 and the year 2021, respectively.

Since the GTCC projections were made at the area municipality level only as far as 2011, we distributed their regional projections for 2021 among area municipalities in each region, in accordance with the 2011 area municipality projections and reflecting an extension of similar trends.

**3.3 URBAN
DENSITIES AND
LAND CONSUMPTION**

Columns L and M, in the middle of the table, show the implied future gross development densities (for population plus non-industrial employment and for industrial employment, respectively) which would exist in each area municipality by 2021, corresponding to the future levels of population and employment and the "greenfields" (unurbanized) land consumed under the concept. In order to estimate the latter, greenfields development was assumed to proceed at relatively low densities, but slightly higher than those experienced during the past decade in the four suburban regions, reflecting recent trends. The assumed incremental gross densities for development on new land were generally in the range 11-15 persons per acre (27-37 per ha) for population plus non-industrial employment, and in the range 6-16 employees per acre (15-40 per ha) for industrial employment, reflecting differences among the area municipalities.

EXHIBIT 5

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Concept 1: Spread: Population, Employment and Land Areas/Densities by Area Municipality

Municipality	1980				2011				2027				Additional New Land Req. if Other 1980/19				Additional New Land Req. if Other 1980/19			
	Population		Employment		Population		Employment		Population		Employment		Population		Employment		Population		Employment	
	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)
METRO	Total Land (1)	Industrial (2)	Residential (3)	Other (4)	Total Land (1)	Industrial (2)	Residential (3)	Other (4)	Total Land (1)	Industrial (2)	Residential (3)	Other (4)	Total Land (1)	Industrial (2)	Residential (3)	Other (4)	Total Land (1)	Industrial (2)	Residential (3)	Other (4)
	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)	(1000s)
Toronto	23,800	2,000	23,800	0	412	448	158	56.5	81.2	15.9	0	0	0	0	0	0	0	0	0	0
York	6,500	5,500	800	4,500	135	28	6	29.7	7.1	32.0	8.6	0	0	0	0	0	0	0	0	0
East York	5,200	4,000	600	5,200	127	36	4	27.2	14.0	30.2	18.1	0	0	0	0	0	0	0	0	0
Etobicoke	30,000	23,100	7,000	36,800	305	71	11	19.3	16.2	18.5	15.2	0	0	0	0	0	0	0	0	0
North York	43,000	38,000	7,000	43,000	565	148	144	19.8	-20.5	24.5	21.3	0	0	0	0	0	0	0	0	0
Scarborough	48,400	34,500	8,800	43,000	485	103	78	17.0	8.2	20.0	11.5	0	0	0	0	0	0	0	0	0
Richmond Hill	194,300	125,200	37,700	152,800	2,183	843	508	24.2	19.3	28.1	18.6	0	0	0	0	0	0	0	0	0
HALTON	48,000	14,000	6,500	26,000	117	24	27	8.8	4.3	10.5	6.6	0	0	0	0	0	0	0	0	0
	68,000	3,000	800	4,700	36	6	7	10.9	8.0	11.0	10.4	0	0	0	0	0	0	0	0	0
Wellington	61,200	3,400	1,300	4,700	47	17	25	11.0	4.8	11.0	8.5	0	0	0	0	0	0	0	0	0
Chatham	34,000	12,700	2,400	15,100	271	52	47	8.2	10.8	10.3	12.6	0	0	0	0	0	0	0	0	0
Quebec	240,700	34,000	10,800	48,400	487	101	144	10.1	4.7	10.5	8.0	0	0	0	0	0	0	0	0	0
PEEL	71,200	32,800	6,200	41,800	314	80	136	13.9	16.8	10.4	16.4	0	0	0	0	0	0	0	0	0
	48,000	13,500	11,000	24,500	188	34	45	16.5	6.1	15.7	7.3	0	0	0	0	0	0	0	0	0
Mississauga	179,000	5,400	2,400	7,800	30	5	3	8.4	1.2	34.4	8.5	0	0	0	0	0	0	0	0	0
St. John's	317,000	51,000	22,800	74,100	1,080	138	182	13.8	8.2	15.1	11.1	0	0	0	0	0	0	0	0	0
YONGE	52,800	11,000	2,800	15,800	115	28	35	12.7	13.6	14.0	10.8	0	0	0	0	0	0	0	0	0
	48,000	7,800	13,700	54,500	85	12	43	8.7	7.4	12.0	12.5	0	0	0	0	0	0	0	0	0
Richmond Hill	13,000	8,000	7,100	18,100	47	6	10	8.7	12.0	10.5	15.8	0	0	0	0	0	0	0	0	0
Aurora	2,800	800	2,000	5,000	21	4	4	8.5	7.8	8.6	10.7	0	0	0	0	0	0	0	0	0
Markham	8,000	3,800	900	4,400	36	7	6	10.9	12.7	11.2	13.1	0	0	0	0	0	0	0	0	0
King	83,700	2,800	1,100	3,700	16	3	1	7.2	1.2	7.1	2.2	0	0	0	0	0	0	0	0	0
East Gwillimbury	66,000	1,800	400	2,700	15	2	0	8.9	0.0	8.6	2.6	0	0	0	0	0	0	0	0	0
Georgetown	3,000	1,000	4,000	8,000	23	4	1	8.4	0.5	8.6	1.8	0	0	0	0	0	0	0	0	0
St. John's	51,000	1,000	2,000	54,000	15	3	2	8.3	7.0	8.2	7.2	0	0	0	0	0	0	0	0	0
St. John's	440,100	41,300	13,500	54,800	281	87	103	10.1	7.7	11.3	11.6	0	0	0	0	0	0	0	0	0
DURHAM	57,400	4,500	1,400	5,900	48	6	8	12.7	5.8	14.2	9.3	0	0	0	0	0	0	0	0	0
	18,000	3,200	700	3,900	37	8	7	13.4	19.3	14.2	12.5	0	0	0	0	0	0	0	0	0
Peel	38,000	4,000	700	5,100	48	8	10	12.7	16.1	14.2	12.5	0	0	0	0	0	0	0	0	0
North York	38,000	11,000	2,700	22,500	124	25	38	13.5	11.5	12.3	12.8	0	0	0	0	0	0	0	0	0
Ontario	181,400	1,800	1,800	6,000	34	6	9	8.9	15.5	10.2	15.5	0	0	0	0	0	0	0	0	0
University	308,400	9,800	4,300	14,200	37	6	5	4.4	1.1	5.0	3.0	0	0	0	0	0	0	0	0	0
St. John's	628,100	37,500	11,700	48,200	328	58	78	10.3	6.6	11.7	8.7	0	0	0	0	0	0	0	0	0
TOTAL	1,797,100	280,000	88,400	378,000	3,728	1,141	688	10.8	10.8	18.7	12.4	0	0	0	0	0	0	0	0	0

(1) Approximate estimates based on mapped areas

(2) Future estimates based on typical development or redevelopment densities in various parts of the GTA by 2007

(3) New "greenfield" land required for additional urbanization of the area, not assumed future decrease. No new land consumed in future since all growth would be through redevelopment

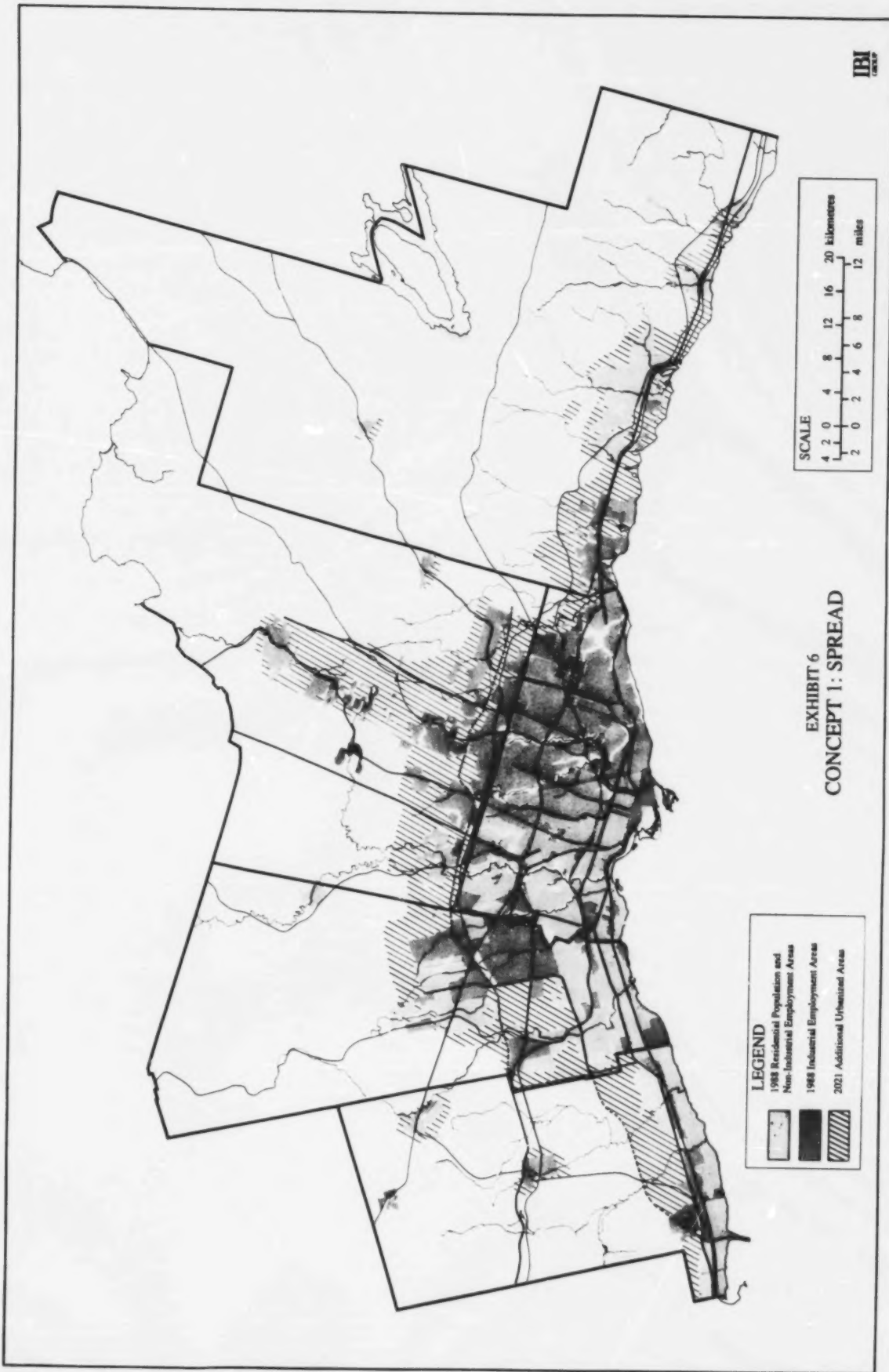
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The future gross development densities shown for the area municipalities within Metro Toronto are the densities at which the residential population plus non-industrial employment (on the one hand) and industrial employment (on the other hand) would be accommodated in 2021 recognizing that there would be no greenfields development in Metro (since no such land is available for development there) and that all of the growth would therefore occur on redeveloped land.

**3.4 MAP OF
CONCEPT 1**

A map showing estimated urbanized areas under Concept 1, Spread, is shown in Exhibit 6. This shows graphically the large amount of greenfields land that would be consumed between the present day and the year 2021 at the relatively low densities postulated under this concept.



4. CONCEPT 2: CENTRAL

4.1 CONCEPT PRINCIPLES

As noted earlier, this concept is based in part on the selection of a postulated 2021 population level for Metro Toronto, taking into account the amount of suitable redevelopable land available in Metro and the number of people who could be housed on that land at appropriate redevelopment densities. Some of the analyses on which a possible 2021 Metro population in the range of 3.8-4 million persons were based are illustrated in Exhibits 7 and 8.

Exhibit 7 illustrates a rather simple exercise which was carried out to estimate what the population of Metropolitan Toronto would be if it were developed at the same gross density as that currently existing in the City of Toronto. As shown in Exhibit 7, slightly more than 3.85 million people could live in Metro Toronto at the gross population density currently experienced in the City of Toronto. This illustrates that a very significant increase in population within Metro would not necessarily be unthinkable in terms of urban function and amenities, since these attributes of the City of Toronto are generally considered to be quite acceptable and this is strongly reflected in the high real estate prices experienced in the City.

Another approach to estimating a possible "holding capacity" for Metro Toronto is illustrated in Exhibit 8. An analysis was carried out to identify major parcels of land within Metro Toronto which could potentially be redeveloped for residential purposes and for mixed residential/employment activities. As shown in Exhibit 8, some 7,500 acres (3,000 ha) were identified with residential potential and an additional 4,200 acres (1,700 ha) with employment potential, for a total of about 11,700 acres (4,700 ha). The distinction between residential and employment is quite broad and, as noted above, it is quite likely that mixed residential/ commercial and, in some cases, mixed residential/industrial activities would likely result on a considerable portion of the redeveloped lands.

For redevelopment within the City of Toronto, a redevelopment density of 300 persons per acre (741 per ha) was postulated. This would correspond to about four times coverage, which is consistent with that in the St. Lawrence housing development and proposed for the Ataratiri development near the mouth of the Don River. In the other parts of Metropolitan Toronto outside of the City of Toronto, a somewhat lower redevelopment density of 240 persons per acre (593 per ha), corresponding to about three times coverage, is assumed. This is consistent with densities currently being approved in

EXHIBIT 7

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Intensification Potential in Metro Toronto

Municipality	Total Area (in acres)	1988 Population (000's)	1988 Gross Density (p.p.a.)	Potential Pop. At 1988 Toronto Densities (000's)
Scarborough	46300	470	10	1133
North York	44400	545	12	1086
Etobicoke	31400	293	9	768
Toronto	24400	597	24	597
York	5800	132	23	142
East York	5300	96	18	130
Metro Total	157600	2133	14	3856

Source: 1989 Municipal Directory

EXHIBIT 8

GTA_metr.wk1

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Metro Toronto Redevelopable Land Estimates (Based on major redevelopment sites only)

Municipality	Total Acres	Gross Redevelopable Acres		Future Density on Redeveloped Land (p.p.a.)	Potential Additional Population (000's)	1988 Population (000's)	Total Population (000's)	Total Density (p.p.a.)
		With Employment Potential	With Residential Potential					
Scarborough	46300	800	2500	240	800	470	1070	23
North York	44400	1100	2000	240	480	545	1025	23
Etobicoke	31400	900	1000	240	240	293	533	17
Toronto	24400	1300	2000	300	800	597	1197	49
York	5800	100	0	240	0	132	132	23
East York	5300	200	0	240	0	97	97	18
Metro Total	157600	4200	7500	256	1920	2134	4054	26

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North York and other parts of Metro for lands similar to those which would be redeveloped under this concept.

Based on these assumptions, Exhibit 8 shows that a potential additional population of some 1.920 million persons could be accommodated in Metro, yielding a future population of some 4.054 million persons. It should be noted that this analysis does not include the additional population which could be accommodated through intensification of residential development along major arteries, as is currently being considered by Metropolitan Toronto and the City of Toronto.

Based on these analyses it was concluded, from the land holding capacity point of view, that a future population of up to 4 million persons in Metropolitan Toronto would be feasible. It was decided, in consultation with the Urban Structure Subcommittee, to test a somewhat lower level of population intensification under Concept 2; that is, a Metro Toronto population of 3.8 million by 2021. This is based partly on the fact that this is slightly less than the population which could be accommodated in Metro if it had the same gross population density as currently exists in the City of Toronto, a density which can be visualized based on the actual situation in the City and which can be seen to be compatible with generally accepted levels of urban density and function for a large urban area.

Another reason for selecting the lower population level in Metro relates to current (December, 1989) population levels and rapid growth rates in the four other regions, particularly York. The postulated population distribution for Concept 2 (3.8 million population in Metro by 2021 versus the higher figure of 4 million) is more compatible with current levels of existing and approved new population in the suburban regions, recognizing that existing initiatives and approved developments must continue. The approach taken in this study is to postulate an intensified/central concept which appears feasible based on the availability of developed and redevelopable land in the built-up area. The next phase of the strategy would likely include studies intended to identify urban settlement options and the required policy changes to achieve the implementation of these options. For Concept 2, the latter could include changes to existing Official Plans and other policy changes to achieve population intensification in central, built-up areas. Other policy changes might apply to encourage the compact/nodal urban structure of Concept 3.

**Greater Toronto Area Urban Structure Concepts Study:
Background Report No. 1: Description of Urban Structure Concepts**

**Broad Density
Comparisons with
Other Areas**

A comparison of Metropolitan Toronto's gross population density with the densities of other major urban centres will help to put this in context. This comparison draws on 1980 data as presented in a recent paper from Murdoch University in Perth, Australia ("Learning from the Best and the Worst: Thirty-Two International Cities with Implications for Gasoline Use and Emissions", by J. R. Kenworthy and W. P. G. Newman, October, 1987). As listed in this paper, the gross population density of Metro Toronto in 1980 was about 16 persons per acre (40 per ha). (The population and residential area data in Exhibit 5 show a similar gross density of 17.5 persons per acre (43 per ha) in 1986 for Metro Toronto.) This is considerably more than the figures of 4 and 5 persons per acre (9.9 and 12 per ha) quoted respectively for Phoenix and Boston in the Murdoch University paper, but less than the densities of 19, 23 and 29 persons per acre (47, 57 and 72 per ha) quoted respectively for Paris, London and Vienna. Much higher densities are quoted for Tokyo (42 persons per acre or 104 per ha) and Hong Kong (117 persons per acre or 289 per ha). On this basis, it can be seen that Metro Toronto falls very much in the middle of the range in comparison with other major world cities. The GTA, with a gross population density in 1986 of about 9 persons per acre (22 per ha), is more comparable with the gross density of New York City (8 persons per acre or 20 per ha), reflecting the large urbanized area and extensive suburban areas which have been developed at low densities in both metropolitan areas during the decades since World War II.

Based on the figures in Exhibit 9, the gross population density of Metro Toronto under Concept 2 would be about 30 persons per acre (74 per ha) in 2021, while the overall density of the GTA would be about 17 persons per acre (42 per ha). It can be seen these densities are still quite moderate in terms of other world metropolitan areas, and the 2021 density in the GTA under Concept 2 would be quite similar to that currently experienced in Metro Toronto. For comparison based on the figures in Exhibit 11, the gross population density in Metro Toronto would be about 22 persons per acre (54 per ha) in 2021 under Concept 3 and the density of the entire GTA would be about 15 persons per acre (37 per ha) under this concept. Under Concept 1, the gross population density in Metro Toronto would be about 19 persons per acre (47 per ha) in 2021 and the density of the entire GTA would be about 13 persons per acre (32 per ha). Gross population density, as presented in the above examples, is defined as total population divided by gross residential acres (including streets, parks, schools, etc.) in the jurisdiction.

EXHIBIT 9

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Concept 2: Central: Population, Employment and Land Area/Densities by Area Municipality

Municipality	Estimated Current Unimproved Land (1)					Population					Future Development (2)					1996					2011					2027				
	Total Land (1)	Non-Ind. & New-Ind.	Industrial	Total (above)	Land Interest (B-E)	Current Density			Population		Future Development			Population		Employment		Population		Employment		Population		Employment						
						Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)	Non-Ind. (1000s)	Industrial (1000s)	Total (1000s)				
METRO																														
Toronto	23,600	21,000	2,800	23,600	0	612	448	156	56.5	56.5	28.7	7.1	36.3	13.0	88.0	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6					
York	5,500	4,500	800	5,500	0	136	28	6	28.7	7.1	36.3	13.0	88.0	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6					
East York	5,500	4,500	800	5,500	0	136	28	6	28.7	7.1	36.3	13.0	88.0	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6	64.6					
Scar. York	20,100	18,100	2,000	20,100	0	101	21	11	17.2	14.8	28.0	22.7	28.0	22.7	28.0	22.7	28.0	22.7	28.0	22.7	28.0	22.7	28.0	22.7	28.0					
North York	43,000	34,000	7,000	43,000	0	305	72	11	18.5	14.2	25.1	21.3	25.1	21.3	25.1	21.3	25.1	21.3	25.1	21.3	25.1	21.3	25.1	21.3	25.1					
Richmond Hill	24,500	21,500	3,000	24,500	3,400	568	168	144	16.6	20.5	34.3	30.0	34.3	30.0	34.3	30.0	34.3	30.0	34.3	30.0	34.3	30.0	34.3	30.0	34.3					
Mississauga	47,400	40,400	7,000	47,400	0	485	103	79	17.0	8.2	24.2	18.2	24.2	18.2	24.2	18.2	24.2	18.2	24.2	18.2	24.2	18.2	24.2	18.2	24.2					
Brantford	128,300	128,300	27,700	128,300	3,400	2,183	843	608	24.2	18.5	42.6	38.1	42.6	38.1	42.6	38.1	42.6	38.1	42.6	38.1	42.6	38.1	42.6	38.1	42.6					
HAMILTON																														
Burlington	48,300	14,000	6,300	38,000	25,400	117	24	27	8.6	4.5	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1					
Hamilton	48,300	14,000	6,300	38,000	25,400	117	24	27	8.6	4.5	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1	5.0	10.1					
Hamilton Hills	91,500	3,500	1,500	4,500	88,000	32	5	6	11.6	4.9	11.1	8.5	11.1	8.5	11.1	8.5	11.1	8.5	11.1	8.5	11.1	8.5	11.1	8.5	11.1					
Chatham	24,500	12,700	1,500	15,100	18,200	87	17	28	8.2	10.9	8.4	12.0	8.4	12.0	8.4	12.0	8.4	12.0	8.4	12.0	8.4	12.0	8.4	12.0	8.4					
St. Catharines	240,700	94,500	18,800	48,000	188,200	271	53	87	8.4	8.1	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5	10.0					
PEEL																														
Mississauga	71,200	52,000	8,200	41,000	29,400	314	80	139	13.9	14.9	15.3	16.0	15.3	16.0	15.3	16.0	15.3	16.0	15.3	16.0	15.3	16.0	15.3	16.0	15.3					
Brampton	68,000	13,800	11,000	34,500	42,200	188	34	45	16.5	4.1	18.0	6.5	18.0	6.5	18.0	6.5	18.0	6.5	18.0	6.5	18.0	6.5	18.0	6.5	18.0					
Caledon	178,000	8,400	2,400	7,800	172,100	30	5	5	6.4	1.2	7.7	2.5	7.7	2.5	7.7	2.5	7.7	2.5	7.7	2.5	7.7	2.5	7.7	2.5	7.7					
Wentworth	317,000	51,000	22,000	74,100	242,900	680	120	180	19.8	19.8	14.6	10.2	14.6	10.2	14.6	10.2	14.6	10.2	14.6	10.2	14.6	10.2	14.6	10.2	14.6					
YORK																														
Markham	52,000	11,000	2,000	13,000	39,000	115	28	36	12.7	12.8	12.4	15.0	12.4	15.0	12.4	15.0	12.4	15.0	12.4	15.0	12.4	15.0	12.4	15.0	12.4					
North York	68,000	7,800	6,000	13,700	54,200	148	12	15	7.4	4.5	11.1	10.2	11.1	10.2	11.1	10.2	11.1	10.2	11.1	10.2	11.1	10.2	11.1	10.2	11.1					
North York Hills	35,300	8,000	3,000	7,100	28,100	47	4	4	8.7	12.8	8.8	10.5	8.8	10.5	8.8	10.5	8.8	10.5	8.8	10.5	8.8	10.5	8.8	10.5	8.8					
Aurora	12,000	3,000	800	3,800	8,200	21	6	4	10.8	7.8	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5					
Newmarket	8,000	3,000	800	4,000	5,000	38	7	6	10.8	12.7	11.1	12.1	11.1	12.1	11.1	12.1	11.1	12.1	11.1	12.1	11.1	12.1	11.1	12.1	11.1					
King	82,700	2,000	1,100	3,700	80,000	18	3	1	7.2	1.3	7.1	1.7	7.1	1.7	7.1	1.7	7.1	1.7	7.1	1.7	7.1	1.7	7.1	1.7	7.1					
St. Catharines	86,000	1,000	800	2,700	85,200	15	2	0	6.8	0.8	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0					
Georgetown	78,000	3,000	1,000	4,000	77,000	23	4	1	6.8	0.8	6.8	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8					
Windsor	51,000	1,000	500	2,300	49,200	16	3	3	8.3	7.6	8.1	7.7	8.1	7.7	8.1	7.7	8.1	7.7	8.1	7.7	8.1	7.7	8.1	7.7	8.1					
Windsor Hills	440,100	41,200	13,000	54,200	586,300	381	87	188	19.1	7.7	16.8	6.8	16.8	6.8	16.8	6.8	16.8	6.8	16.8	6.8	16.8	6.8	16.8	6.8	16.8					
DETROIT																														
Detroit	97,400	4,800	1,400	5,800	91,600	48	8	8	12.7	9.6	13.7	8.1	13.7	8.1	13.7	8.1	13.7	8.1	13.7	8.1	13.7	8.1	13.7	8.1	13.7					
Warren	18,000	2,800	700	3,500	12,700	37	6	7	13.4	10.9	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	14.0					
Ann Arbor	38,500	4,400	2,700	5,100	31,400	47	6	10	12.2	14.1	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0					
Chelsea	11,000	2,700	2,700	12,700	22,000	134	25	25	15.5	14.8	13.8	15.3	13.8	15.3	13.8	15.3	13.8	15.3	13.8	15.3	13.8	15.3	13.8	15.3	13.8					
Warren Hills	101,400	8,000	4,000	12,000	93,400	51	6	6	8.6	4.0	8.6	9.6	8.6	9.6	8.6	9.6	8.6	9.6	8.6	9.6	8.6	9.6	8.6	9.6	8.6					
Warren Hills Hills	8,000	4,200	4,200	14,200	314,200	37	6	5	4.4	1.1	4.7	1.6	4.7	1.6	4.7	1.6	4.7	1.6	4.7	1.6	4.7	1.6	4.7	1.6	4.7					
Warren Hills	628,500	37,500	11,700	48,200	577,200	328	58	78	10.3	6.6	11.1	6.5	11.1	6.5	11.1	6.5	11.1	6.5	11.1	6.5	11.1	6.5	11.1	6.5	11.1					
Grand Total	1,397,200	200,000	68,000	278,000	1,665,100	3,729	1,141	1,451	18.8	10.6	22.4	13.0	22.4	13.0	22.4	13.0	22.4	13.0	22.4	13.0	22.4	13.0	22.4	13.0	22.4					

(1) Population estimates based on regional data.
 (2) Future estimates based on typical development or redevelopment scenarios at various points of the 0.1% by 2027.
 (3) New "grandfather" land required for additional urbanization at the specified assumed future densities. No new land consumption or future growth would be through redevelopment.



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**4.2 DISTRIBUTION
OF POPULATION
AND EMPLOYMENT**

The estimated distribution of population and employment in 2011 and 2021 under Concept 2, by area municipality, is shown in Exhibit 9. The tabular layout of Exhibit 9 is the same as that described earlier for Exhibit 5. As shown, the population within Metro Toronto would be substantially higher under this concept than under Concept 1, with correspondingly higher levels of employment but not such an extreme difference in this variable. Reflecting this, population levels in the four adjacent regions and their area municipalities would be substantially lower, as shown, and there would be a more even balance of population and employment in each of the five regions.

**4.3 URBAN
DENSITIES AND
LAND CONSUMPTION**

The other major differences between Concept 2, as shown on Exhibit 9, and Concept 1, as shown on Exhibit 5, are the higher gross densities and much smaller consumption of greenfields land implied by Concept 2 relative to Concept 1. The total values for the entire GTA, in this regard, were discussed earlier in section 2.3; details by area municipality are shown in Exhibits 9 and 5, allowing a comparison between the two concepts at the area municipality level. Generally the incremental population densities in the suburban regions would be similar to those under Concept 1 while the redevelopment densities in Metro would be substantially higher, as shown in Exhibit 8.

**4.4 MAP OF
CONCEPT 2**

The areas which would be urbanized between 1986 and 2021 under Concept 2 are illustrated in map form in Exhibit 10. A comparison with Exhibit 6 shows in graphic form that Concept 2 would consume substantially less greenfields land than would Concept 1. The difference, of course, is that as much as 11,000 acres (4,500 ha) of land within Metro Toronto, currently in industrial, institutional or other low density uses, would be redeveloped for higher density residential and mixed residential/employment uses under Concept 2 and, as shown in Exhibit 9, population levels in the four regions surrounding Metro would be considerably lower than they would under Concept 1.

Also shown conceptually in Exhibit 10 are possible locations of population/employment concentration in Metro and Mississauga under Concept 2. As noted earlier, these are based on designated centres and major sites of redevelopable land.

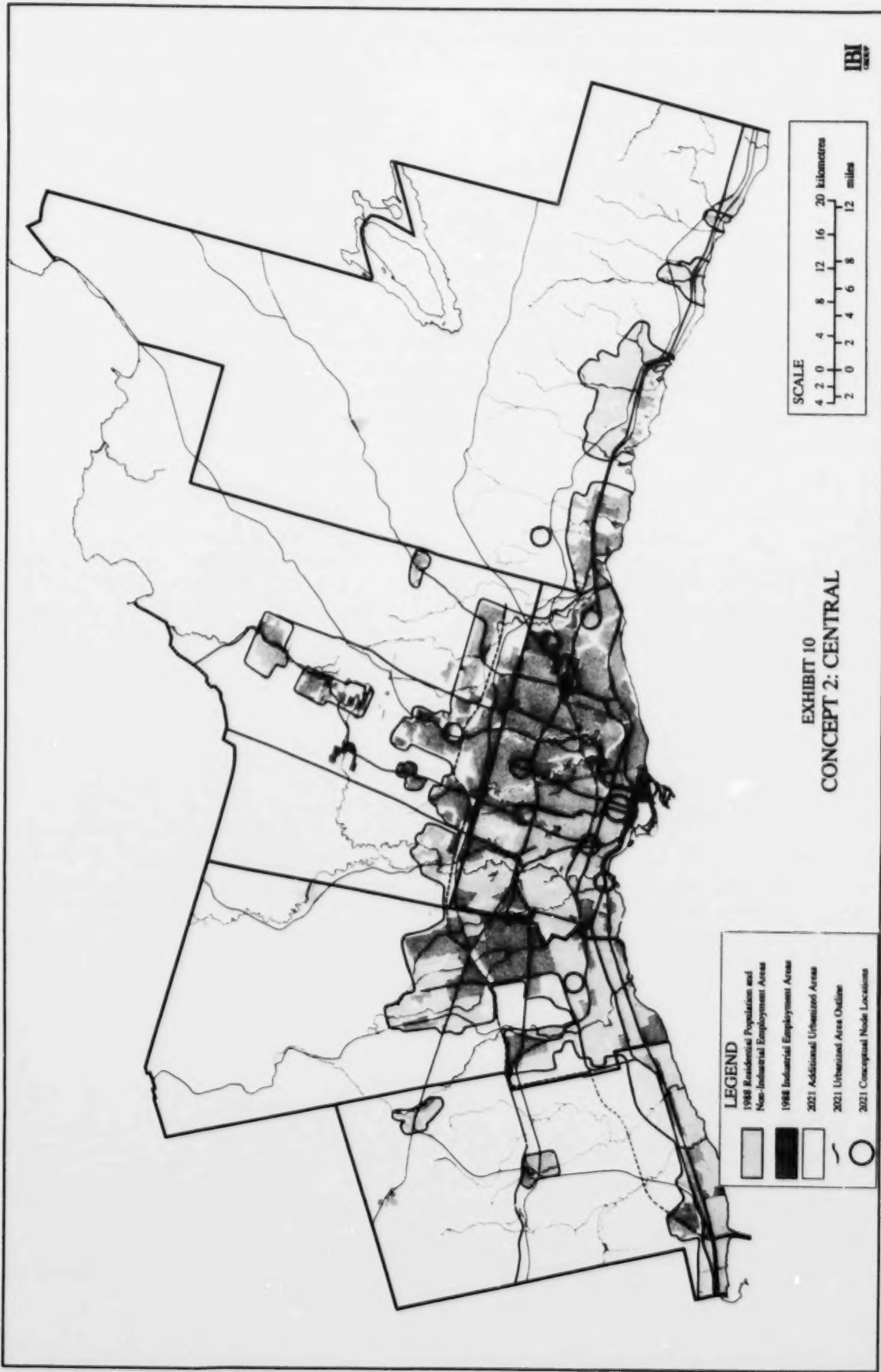


EXHIBIT 10
CONCEPT 2: CENTRAL

5. CONCEPT 3: NODAL

5.1 CONCEPT PRINCIPLES

As described earlier, this concept assumes lesser concentration of resident population in Metropolitan Toronto than would be the case under Concept 2 (some 2.8 million people by 2021 under Concept 3, versus 3.8 million people under Concept 2) which would mean that 1 million additional people would be living in the four surrounding regions by 2021 under Concept 3 relative to Concept 2. This means that there would be almost as many people living in the four surrounding regions under Concept 3 as there would be under Concept 1, particularly in Peel Region. The important distinction between Concepts 1 and 3, as noted earlier in Section 2.2, is that the density of population and non-industrial employment under Concept 3 would be higher in the four surrounding regions than it would under the spread city assumptions of Concept 1. This would be achieved in Concept 3 by a nodal urban form, with compact development in and around existing communities, carefully integrated with existing development. Nodes of these types, including both residential population and employment, would be located particularly in communities well served by commuter rail or rapid transit.

As background to describing such a nodal concept in generic terms, a hierarchy of three categories of nodes was considered, as follows:

Node Category	Population Range	Typical Population	Typical Employment
A Nodes	75,000 +	100,000	50,000
B Nodes	25,000 - 75,000	50,000	25,000
C Nodes	5,000 - 20,000	10,000	5,000

Each node would also have a level of employment which would yield an activity rate for the node about equal to the regional activity rate for the area municipality, with variations higher or lower than this in specific nodes depending on factors such as the urban context and the size and density of the node.

Typically, A nodes would be located on a major commuter rail or rapid transit line in communities which are already reasonably well established and where there is sufficient land available for redevelopment/development into residential and mixed residential/employment uses. B nodes and C nodes would also desirably be located on commuter rail or rail rapid transit lines, but would be in

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areas where less land is available, and/or which are located farther from the Metropolitan centre. In some instances, the smaller two categories of nodes might not be located on a commuter rail or rail rapid transit line, but might be served rather by express bus. While the emphasis is on rail transit to serve such nodes, clearly the locations of major existing and new highways will also be important in considering nodal sizes and locations, particularly those which have a greater emphasis on employment activities relative to residential population.

A relatively compact node with, say, 100,000 people and 50,000 jobs in it would typically generate about 20,000 work trips in the peak hour. Depending on the mix of people and jobs in the node, its distance from the Metropolitan centre, and the availability of other suitable jobs in the surrounding region, typically about one-third of the commuting trips could be to work opportunities in the same node, another third to work opportunities in the four regions surrounding Metro, and the remaining third to work opportunities in Metro Toronto, of which one-third, in turn, could be destined for the metropolitan Central Business District (CBD). These numbers would, of course, vary considerably depending on specific circumstances, but they are useful as a preliminary indicator of the relationship between size/type of node and required transportation system capacity to serve it. For example, an A node with 100,000 people and 50,000 jobs, based on the above assumptions, might typically require enough commuter rail and rail rapid transit capacity to move about 1,000 work trips to the Metropolitan central area and additional 2,000 work trips to the remainder of Metro, in the peak hour, assuming that fifty percent of the work trips would be by transit, and the other fifty percent by auto. An additional 6,000 or 7,000 trips directed to work opportunities in the regions surrounding Metro would require enough road capacity to serve perhaps 4,000 - 5,000 person trips by auto in the peak hour, with the remainder carried on rapid and local transit, while the remaining 6,000 or 7,000 work trips would be served by a combination of local transit, automobile and pedestrian travel, depending on the density, urban form and available transportation services in the node itself. The transit market share could be considerably higher than the above numbers (e.g. 85-90% transit use to the CBD) based on the level of transit service provided and on other factors which will be examined as part of the transportation analysis. For example, experience in GTA communities with a high level of commuter rail travel to the CBD (e.g. on the Lakeshore west line) has shown that people with jobs in the CBD will preferentially locate in such communities and will exhibit a very high orientation to the CBD and a high market penetration of commuter rail.

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It can be seen that an A node would therefore require a commuter rail or rapid transit line, typically, to serve the estimated commuting trips to the metropolitan downtown area and to other nodes and work opportunities in the remainder of the GTA. The work trip volumes and required capacities would be correspondingly smaller for B nodes and C nodes, such that other forms of rapid transit (e.g. express buses) could be considered in some instances.

The above principles were broadly considered in developing a generic compact/nodal concept.

**5.2 DISTRIBUTION
OF POPULATION
AND EMPLOYMENT**

The assumed distributions of population and employment by area municipality under Concept 3 are tabulated in Exhibit 11. In line with the overview discussion of section 2.3, it can be seen that there would be about 372,000 more people in Metro by 2021 under Concept 3 than under Concept 1, which means that, while smaller than under Concept 1, there would be a very substantial growth of population in the four adjacent regions with correspondingly significant rates of employment growth and a greater level of population/employment balance in each region under Concept 3 than under Concept 1. The distribution of population and employment postulated for Concept 3, as shown in Exhibit 11, assumes that most of the growth would be concentrated in and around existing communities and population/employment centres, with greater emphasis on those in and close to the existing urbanized area than on more remote communities.

**5.3 URBAN
DENSITIES AND
LAND CONSUMPTION**

It can be seen from Exhibit 11 in comparison with Exhibits 5 and 9, that the gross urban densities for population plus non-industrial employment under Concept 3 would be higher in the four suburban regions than those under Concepts 1 or 2, although the overall GTA density would be less than that under Concept 2 because Concept 3 would have less population intensification in Metro Toronto. This is in line with the typology of the three concepts, as discussed earlier in section 2.2. Generally, incremental population plus non-industrial employment gross densities in the four suburban regions under Concept 3 would be in the range of 15-30 persons per acre (37-74 per ha). The consumption of greenfields land under Concept 3 would, as a result, be intermediate between that under Concepts 1 and 2, and the way in which this land consumption would be distributed among the area municipalities is shown in Exhibit 11. The amount of new land consumed for industrial employment in Concept 3 is quite similar to that for Concept 1, reflecting the fairly similar levels of industrial employment in the four suburban regions and the fact that industrial employment on greenfields land does not lend itself to compact, nodal densities. If it were not for this factor,

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Concept 3: Nodal: Population, Employment and Land Areas/Densities by Area Municipality

Municipality	Total Land (1) (hectares)	Estimated Current Unimproved Land (1)			Residential Land (hectares) (B-E)	1980			2011			Projections Future 20 Years			Additional Net Land Need of (Over 1980) (2)			Additional Net Land Need of (Over 1980) (3)			2021			Population			Total (hectares)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		Total (hectares)	Non-land (hectares)	Industrial (hectares)		Population (1 000s)	Non-land (1 000s)	Employment (1 000s)	Industrial & Non-land (1 000s)	Population (1 000s)	Non-land (1 000s)	Employment (1 000s)	Population (1 000s)	Non-land (1 000s)	Employment (1 000s)	Population (1 000s)	Non-land (1 000s)	Employment (1 000s)	Population (1 000s)	Non-land (1 000s)	Employment (1 000s)	Population (1 000s)	Non-land (1 000s)	Employment (1 000s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

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1) Approximate estimates based on rugged areas

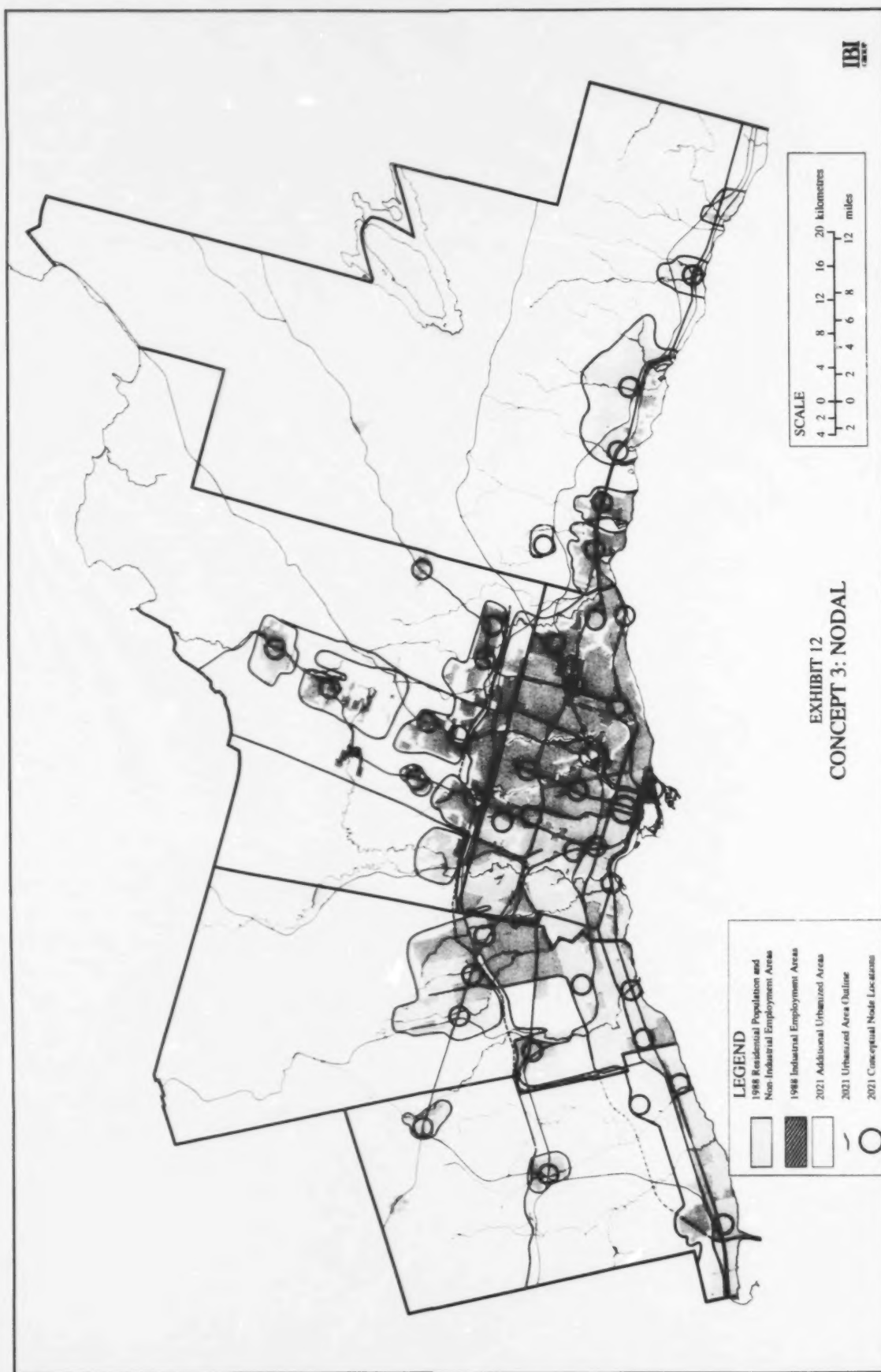
3) New "greenfields" land required for additional urbanization at the expected assumed future densities. Net new land consumed in Metro service area growth would be through redevelopment

**5.4 MAP OF
CONCEPT 3**

there would be a larger difference between the new land consumed under Concepts 1 and 3.

Concept 3 is shown conceptually in map form on Exhibit 12. In line with the earlier discussion in section 2.2, we have not attempted to show a hierarchy of nodes or even their exact locations on the map, in order to stress the "pre-planning" nature of this and the other two concepts. It will be noted, however, that there is a general correspondence between the locations of some nodes within the existing urbanized area under Concept 3 (as shown on Exhibit 12) and those for Concept 2 shown on Exhibit 10. This reflects the existence of the CBD and various city centres and the locations of major redevelopable land sites, as discussed earlier. The types of node locations conceptually illustrated in the four regions adjacent to Metro are intended to illustrate potential locations which reflect existing communities and existing or expanded transportation networks, particularly commuter rail and rapid transit.

At this stage, we have deliberately refrained from estimating the size and exact location of possible nodes, for the reasons outlined in the previous paragraph. The projected population and employment levels for 2011 and 2021 in each area municipality provide information on the assumed distribution of urbanization under Concept 3. For purposes of infrastructure analysis, we take into account the differences in gross density between Concept 3 and the other two concepts in each area municipality, as well as the possible locations of nodes under Concept 3 in broad terms, in estimating impacts on transportation capacity requirements, modal splits, water/sewer requirements, human services and greening/environment implications, etc.



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**6. A BASIS FOR
COMPARISONS**

The consultant team developed the above three urban structure concepts in consultation with the Urban Structure Subcommittee (USSC). The concepts were prepared as the basis for assessing the infrastructure and related needs, including capital costs, of each concept in terms of the following:

- transportation requirements, including trans-GTA facilities and connections to the surrounding areas along with transportation/utility corridors and urban separators;
- hard servicing needs in terms of trunk water and sewer systems and solid waste management facilities;
- human services and facilities, including health, education, cultural/recreation, social and protection requirements and their capital costs;
- greening/environment implications, the ability to provide urban separators, and impacts on preservation of the natural attributes of the GTA and the potential to recover those that are currently threatened or require substantial rehabilitation: and
- external impacts on the hinterland areas adjacent to the GTA.

Comparisons of the three concepts were then developed based on the above analyses and involving other, more qualitative criteria. The results of this work are described in the Summary Report and, in more detail, in the companion background reports of this study.